

Weekly Report

Yuxin Ma

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Research

Mobile Record Data

- **Markov Dynamics Modelling** In <http://wiki.swarma.net/index.php> there is a short survey on flow network. The Markov chain method is one of the popular methods that describes the dynamics in the flow method and widely used in many applications like node ranking and community detection [1]. In recent years the second or high-order Markov chain [2] is involved into flow analysis, which can extract unusual patterns that one-order method cannot detect¹. In the next week I will find more papers on Markov chain methods and figure out if this model is useful to support our analysis.
- **Analysis Process** One of the task that we can consider about is to give semantic tags to interesting flow. Figure 1 describes the analysis process. I am trying to figure out if the Markov chain model support this analysis process.

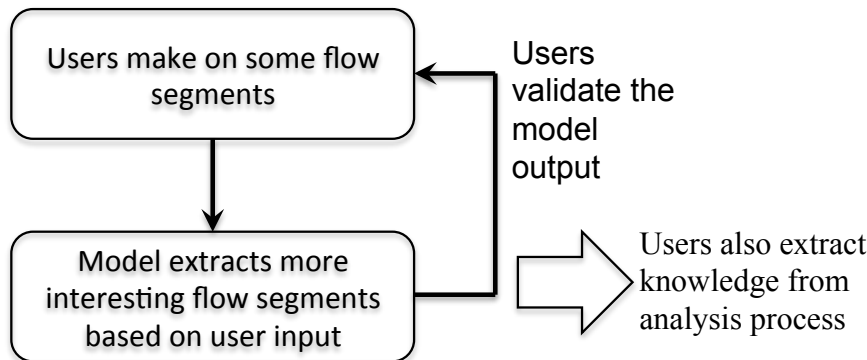


Figure 1: Analysis Process.

Chinese Historical Data

- **Data Processing and Investigation** Most of the tables from the original Access Database has been transformed into MySQL for further development. The next step is to 1) implement a simple interface that provides a node-link graph view to display

¹Inspired by the hints from Prof. Jin Xiaogang in the meeting. I googled with query “flow network one order second order” and found that Markov chain just matches the idea of “extracting high-order patterns from the network”.

the social relations between people; 2) gather statistics about the dataset, especially the distributions of available records on each person.

- **Paper Survey** Currently we pay our attention to search recent works on 1) social network analysis and 2) heterogeneous network analysis.

Misc.

- **VIS 2014 Workshop** I was re-organizing the original version into a 4-page version. In the next week it will be the main task.

Plan for Next Week

- Finish the workshop submission;
- pass the mid-term qualification;
- find more papers on high-order Markov chain methods.

References

- [1] M. Rosvall and C. T. Bergstrom, “Maps of random walks on complex networks reveal community structure,” *Proceedings of the National Academy of Sciences*, vol. 105, no. 4, pp. 1118–1123, 2008.
- [2] M. Rosvall, A. V. Esquivel, A. Lancichinetti, J. D. West, and R. Lambiotte, “Memory in network flows and its effects on spreading dynamics and community detection,” *Nature Communications*, vol. 5, pp. 1–13, 2014.